Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FCC 92-357

In the Matter of	)	
	)	
Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies	)	ET Docket No. 92-9
	)	RM-7981
	)	RM-8004

FURTHER NOTICE OF PROPOSED RULE MAKING

Adopted: August 5, 1992; Released: September 4, 1992

Comment Date: December 4, 1992
Reply Comment Date: January 6, 1993

By the Commission:

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INTRODUCTION

1. The Commission herein proposes to reallocate five bands above 3 GHz to private and common carrier fixed microwave use on a co-primary basis and to prescribe additional technical standards to govern use of these bands. These proposals respond to petitions for rule making filed by the Utilities Telecommunications Council (UTC) (RM-7981) and Alcatel Network Systems, Inc. (Alcatel) (RM-8004).

2. This action bolsters the Commission's commitment that the quality and availability of service provided by the licensees now operating in the 2 GHz band not be reduced. We recognize the importance of these services, and intend to take any steps necessary to prevent disruptions to them. Today's proposals are intended to ensure that alternative frequencies will be available to 2 GHz licensees that are suitable for providing equivalent service with comparable reliability.

BACKGROUND

3. The Notice of Proposed Rule Making (Notice) in this proceeding proposed to reallocate to emerging telecommunications technologies 220 MHz of the 1.85-2.20 GHz (2 GHz) band.[1] Specifically, the Notice proposed that the 1.85-1.99, 2.13-2.15, and 2.18-2.20 GHz bands now allocated to the Private Operational-Fixed Microwave Service (Part 94) and the 2.11-2.13 and 2.16-2.18 GHz bands now allocated to the common carrier Domestic Public Fixed Radio Services (Part 21) and Public Mobile Service (Part 22)[2] be reallocated.

4. In the Notice, the Commission recognized that the private and common carrier licensees operating in the 2 GHz band provide important and essential services. We emphasized, therefore, that any reallocation should prevent disruption to these services. We also stated that it appears to be technically feasible to relocate 2 GHz licensees to alternative media or to higher frequency fixed microwave bands. We observed that a technical study by our staff indicates that the existing higher frequency fixed service bands appear to offer adequate capacity for reaccommodating the existing 2 GHz operations and can support the path lengths of those operations. We therefore proposed to make the 3.7-4.2, 5.925-6.425, 6.525-6.875, 10.7-11.7, 11.7-12.2, 12.7-13.25, and

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[1] Notice of Proposed Rule Making, ET Docket No. 92-9, 7 FCC Rcd 1542 (1992).

[2] Part 22 use is limited to fixed control and repeater stations functioning in conjunction with the Public Land Mobile Service.

17.7-19.7 GHz bands available to existing 2 GHz licensees for relocation, and to apply the technical rules and coordination procedures for each of these bands to the relocated operations.[3] To provide for this reaccommodation of 2 GHz licensees, we proposed a "blanket" waiver of the eligibility requirements in these bands.

5. Comment was solicited on a number of options for easing the transition, ranging from allowing negotiations between existing users and those developing new services with no fixed time for mandatory relocation, to altering the 2 GHz fixed service allocation to secondary status at the end of the normal equipment life expectancy of 10 or 15 years. We proposed to permit significant flexibility in negotiations, allowing parties to negotiate financial arrangements to encourage reaccommodation and to underwrite the costs of transition for the existing users and earlier access by the new users. Finally, we stated that during the pendency of this rulemaking we would continue to grant applications for 2 GHz fixed operations, but that applications for new facilities would be granted only on a secondary basis, pending the outcome of this proceeding.[4]

6. UTC Petition. In its petition, UTC -- the national representative on communications matters for electric, gas, water, and steam utilities -- contends that the Commission must adopt specific technical rules to accommodate in other bands the 2 GHz private and common carrier fixed stations potentially affected by the proposals contained in the Notice and to provide spectrum for new private microwave systems. UTC proposes that we commence a separate rule making to make available for private fixed microwave use the 1.71-1.85 GHz band allocated for government fixed and mobile use, the 3.7-4.2 GHz (4 GHz) and 5.925-6.425 GHz (6 GHz) bands allocated for Part 21 and Part 25 (satellite communications) uses, and the 10.7-11.7 GHz (11 GHz) band allocated for Part 21 use. UTC also urges the Commission to adopt appropriate channeling plans and technical standards to ensure that these bands can accommodate the needs of private microwave users.

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[3] We also invited comment on the feasibility of making available to 2 GHz fixed users a portion of the 1.71-1.85 GHz government band. Subsequently, we solicited public comment on the NTIA report entitled "Federal Spectrum Usage of the 1710-1850 and 2200-2290 MHz Bands;" see Public Notice, Mimeo No. 22951, released May 4, 1992.

[4] On May 14, 1992, we issued a Public Notice stating that this conditional secondary status will not be applied to most major modifications to existing 2 GHz construction authorizations or licenses, since most such modifications will not significantly affect the use and availability of existing 2 GHz spectrum; see Public Notice, Mimeo No. 23115.

7. UTC maintains that neither the 4 or 6 GHz common carrier nor the 6.525-6.875 GHz (6 GHz) private bands are suitable as presently configured for most private microwave systems due to incompatible channelization. By way of example, UTC states that most channels in the 6 GHz private band are 5 or 10 MHz wide and that the remaining narrower channels can accommodate only about one-fourth of the 13,000 stations that currently use the narrow 2 GHz channels. Also, UTC asserts that, with respect to the 4 and 6 GHz common carrier bands, loading requirements would disqualify most private microwave systems from relocating. Further, according to UTC, the number of satellite earth stations in the 4 GHz band impairs reaccommodation of 2 GHz fixed users. UTC therefore recommends several changes to the existing rules governing use of the 4 and 6 GHz common carrier bands, that the 11 GHz common carrier band be made available to Part 94 users, and that the Commission negotiate with the National Telecommunications and Information Administration (NTIA) to permit use of the 1.71-1.85 GHz government band for non-government use.

8. Alcatel Petition. In its petition, Alcatel -- a subsidiary of Alcatel Alsthom, the world's largest manufacturer and supplier of telecommunications equipment -- states that the Commission should not require fixed microwave users to vacate the 2 GHz band until it adopts specific rules to allow the 2 GHz services to operate in other bands. In particular, Alcatel expresses concern about 2 GHz low and medium capacity fixed systems being relocated to primarily high capacity bands above 3 GHz. Alcatel asserts that merely allowing low capacity 2 GHz users to migrate to the higher frequency bands without certain rule changes would be inefficient. While it prefers maintenance of the status quo at 2 GHz, Alcatel recognizes that Personal Communications Services (PCS) and other emerging technologies are in the public interest and require spectrum. However, Alcatel asserts that fiber optics, satellite, and cable media are not viable alternatives for fixed microwave users. It argues that cost considerations preclude the use of each and that, in addition, fiber optics suffers from reliability problems, satellite bandwidth is not readily available, and cable has inherently low capacity. Accordingly, Alcatel proposes the 4, 6, and 11 GHz reallocations proposed by UTC and also proposes that the shared government/non-government 3.6-3.7 GHz, the 6 GHz private, and the 10.565-10.615/10.630-10.680 GHz (10 GHz) private and common carrier point-to-multipoint bands be reallocated to permit co-primary private and common carrier fixed microwave use. Alcatel states that its proposed reallocations would result in private users having access to an additional 2120 MHz[5] of spectrum and common carriers having access

[5] Alcatel calculates the amount of spectrum currently available to private fixed users as 460 MHz. However, this calculation omits 100 MHz of the 180 MHz of spectrum currently available in the 1850-1990, 2130-2150, and 2180-2200 MHz bands.

to an additional 510 MHz. Alcatel further proposes a detailed channelization plan for the reallocated bands and major amendments to several technical rules.

DISCUSSION

9. Commenting parties generally support the basic thrust of the UTC and Alcatel petitions, but express reservations about certain aspects of each. Parties representing common carriers appear to be more concerned about the proposals than parties representing private users. Issues raised in the petitions are addressed individually below.

10. Reallocation and Channelization Plan. UTC and Alcatel make the following specific proposals with respect to each band proposed for reallocation:

1) 1.71-1.85 GHz -- Negotiations with NTIA to permit shared government and non-government use (UTC).

2) 3.6-3.7 GHz -- Reallocation to private and common carrier fixed use on a co-primary basis with existing government and non-government aeronautical radionavigation, radiolocation, and fixed satellite services; channelization into an overlapping[6] twenty-four 400 kHz pairs, twelve 800 kHz pairs, thirty 1.6 MHz pairs, eight 5 MHz pairs, and four 10 MHz pairs (Alcatel).

3) 4 GHz -- Reallocation to private fixed use on a co-primary basis with existing common carrier fixed and satellite communications services; designation of at least 80 MHz of this spectrum for primary use by fixed users only (UTC and Alcatel); rechannelization from twelve 20 MHz channel pairs to 1.6, 5, and 10 MHz channels (UTC); rechannelization to an overlapping twenty-four 400 kHz pairs, twelve 800 kHz pairs, twenty-four 1.6 MHz

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Thus, while Alcatel's plan provides a total of 2580 MHz to private fixed users, the additional amount is actually 2020 MHz, rather than 2120 MHz.

[6] In an overlapping channelization plan, channels of different bandwidth share spectrum; e.g., in Alcatel's 3.6-3.7 GHz channelization plan, the first 400 kHz channel uses the 3640.0175-3640.4175 MHz band, the first 800 kHz channel uses the 3640.025-3640.825 MHz band, and the twenty-fifth 1.6 MHz channel uses the 3640.04-3641.64 MHz band. Since these three channels share the 3640.04-3640.4175 MHz band, only one of the three can be assigned in a given area (absent time sharing). The advantage of an overlapping channelization plan is that it permits different numbers of channels of a given bandwidth to be assigned in different geographic areas, depending upon need.

pairs, twelve 3.2 MHz pairs, six 5 MHz pairs, twenty-five 10 MHz pairs, and twelve 20 MHz pairs (Alcatel).

4) 6 GHz (common carrier) -- Reallocation to private fixed use on a co-primary basis with existing common carrier fixed and satellite communications services (UTC and Alcatel); rechannelization from eight 29.65 MHz channel pairs to 1.6, 5, and 10 MHz channels (UTC); rechannelization to an overlapping twenty-four 400 kHz pairs, twelve 800 kHz pairs, forty-two 1.6 MHz pairs, twenty 3.2 MHz pairs, twelve 5 MHz pairs, twenty-four 10 MHz pairs, and eight 30 MHz pairs (Alcatel).

5) 6 GHz (private) -- Reallocation to common carrier fixed use on a co-primary basis with the existing private fixed service; rechannelization from an overlapping five 800 kHz pairs, three 1.6 MHz pairs, fifteen 5 MHz pairs, and sixteen 10 MHz pairs to an overlapping twelve 400 kHz pairs, six 800 kHz pairs, forty-five 1.6 MHz pairs, fifteen 5 MHz pairs, and sixteen 10 MHz pairs (Alcatel).

6) 10 GHz -- Reallocation from private and common carrier point-to-multipoint (Digital Termination Service (DTS) and Digital Electronic Message Service (DEMS), respectively) use to private and common carrier point-to-point fixed use on a co-primary basis; channelization into an overlapping twenty-four 400 kHz pairs, twelve 800 kHz pairs, thirty 1.6 MHz pairs, twenty 2.5 MHz pairs, and eight 5 MHz pairs (Alcatel).

7) 11 GHz -- Reallocation to private microwave use on a co-primary basis with the existing common carrier fixed service (UTC and Alcatel); rechannelization from twelve 40 MHz pairs to an overlapping fifty 10 MHz pairs and sixteen 30 MHz pairs (Alcatel).

11. UTC and Alcatel contend that the above plans are consistent with changes in the microwave communications industry. Alcatel states that while common carriers have made extensive use of long haul systems using full blocks of 4 and 6 GHz frequencies, with the proliferation of fiber optic systems few new multichannel systems are being built. Also, according to Alcatel, common carriers increasingly need low capacity systems to extend digital loop carrier systems over rough terrain and to connect remote cell sites in cellular Rural Service Areas, while private operators have new requirements for high capacity systems to carry high-speed local area network traffic and digitized video between buildings in private networks. Consequently, Alcatel asserts, microwave operators are demanding flexible radio equipment that can be used for low or high capacities as service requirements change and the equipment needs of common carriers and private operators increasingly become similar. Therefore, Alcatel concludes, co-primary sharing of several bands is technically feasible.

12. Comsearch strongly supports a band sharing plan, contending that the distinction between private fixed users and common carriers should be eliminated for the purpose of band allocation. American Petroleum Institute and Microwave Radio Corporation state that Alcatel's proposals would help ensure that adequate spectrum remains available to private fixed microwave users. However, Harris Corporation - Farinon Division (Harris) argues that since the Notice proposed to reallocate 180 MHz of 2 GHz spectrum from private users versus only 40 MHz from common carriers, the 6 GHz private band should not be available for sharing by common carriers. Accordingly, it recommends that this band be excluded from the sharing plan or that, alternatively, private users be allowed to share Part 74 (broadcast auxiliary) spectrum.

13. The National Spectrum Managers Association maintains that the Commission should establish rules that will encourage 2 GHz fixed users to seek spectrum in bands that already have narrowband channelization plans. MCI Telecommunications Corporation (MCI) states that if the Commission intends to proceed with its proposed 2 GHz reallocation, it should revise its rules regarding channelization, bandwidth, and technical standards in higher fixed bands to provide for orderly and efficient use of the spectrum. However, MCI believes that these bands should be shared only between compatible bandwidths to ensure efficient spectrum utilization. Further, MCI argues that Alcatel's proposal aids private users at the expense of common carriers. MCI argues that common carriers currently have 2,070 MHz of spectrum available on an exclusive basis, which is superior to the 2,580 MHz of shared spectrum that they would have under Alcatel's proposal. In MCI's view, the common carrier 4, 6, and 11 GHz bands are already congested, so that permitting private use of them would lead to lack of spectrum availability.

14. Pacific Telesis Group (PacTel) states that private users should not be allowed access to the 6 and 11 GHz common carrier bands. PacTel contends that the 4 GHz band is essentially closed to terrestrial users due to potential interference to earth stations and that the 6 and 11 GHz bands are the only long haul, high capacity bands available to common carriers. In PacTel's view, Alcatel's assertion that multi-channel, high capacity radio routes are now seldom required is incorrect. PacTel says that its subsidiaries have both single channel and multi-channel requirements and that allowing the 6 and 11 GHz bands to be rechannelized and opened to private use would exacerbate the current shortage of high-capacity channels. Further, PacTel argues that Alcatel's proposal to sub-divide each 30 MHz channel in the 6 and 11 GHz bands into three 10 MHz channels for medium capacity use and to allow the medium capacity user to occupy the center frequency would be inefficient, because channel and polarization constraints likely would prevent the two adjacent channels from being used if needs of the medium capacity user do

not increase. Moreover, PacTel asserts that some narrowband users may overstate their channel loading and apply for 10 MHz channels, thus leading to even greater inefficiency.

15. Communications Transmission, Inc. (CTI) opposes the Alcatel Petition, contending that it is premature and would balkanize the microwave spectrum. CTI states that Alcatel proposes rule changes to overcome relocation problems that a 2 GHz fixed user may never face. Also, CTI says that Alcatel's proposal to sub-channelize the spectrum would limit the ability of common carriers to expand their capacity to meet customer needs and increase the risk of interference to existing microwave users. Further, in CTI's view, Alcatel's sharing proposal would result in a large number of comparative hearings to decide whether the use of spectrum in a certain location is more in the public interest for a common carrier or private applicant. CTI maintains that currently there exists a well-organized system of common carrier frequency coordination that would be severely disrupted by the co-mingling of private and common carrier users. Finally, CTI asserts that the existing data base would take many months, if not years, to update if private users are allowed access to common carrier bands.

16. Bonneville International Corporation, Capital Cities/ABC, Inc., CBS Inc., Communications Satellite Corporation (Comsat), GE American Communications, Inc. (GE Americom), GTE Service Corporation (GTE), Home Box Office (HBO), Hughes Communications Galaxy (Hughes), IDB Communications Group, Inc., National Public Radio, Inc., Pan American Satellite, and United Video, Inc. oppose UTC's and Alcatel's proposal to reallocate at least 80 MHz of fixed-satellite spectrum in the 4 GHz band from primary to secondary use. Comsat contends that fixed satellite users need this spectrum, and argues that satellite use across the 4 GHz band need not preclude terrestrial use, if coordination procedures are adequate. GE Americom says that reallocating 40 MHz on each side of this band from fixed satellite use, as proposed by Alcatel, would undermine the efficiency of high-technology satellites and antennas using this band, in which cable television programmers have invested millions of dollars. GE Americom argues that Alcatel's proposal would force these programmers to relocate to a higher band and forfeit this large investment. GTE states that the 4 GHz band already is very congested, and reallocating 80 MHz from fixed satellite use would severely restrict satellite and earth station operation at 4 GHz. Further, in GTE's view, reallocation would create uncertainties in the market regarding the reliability and stability of satellite-based technologies. HBO asserts that the Alcatel proposal would eliminate four full downlink transponders at 4 GHz, creating a detrimental impact on operators and users of 4 GHz satellites, especially with respect to television distribution. Hughes contends that Alcatel has failed to demonstrate that the needs of fixed microwave users cannot be met either by co-primary use of 4 GHz spectrum or by

alternative media.

17. We find merit in many of the proposals made by UTC and Alcatel. We are sensitive to the needs of 2 GHz fixed users for channelization plans and technical standards that meet their specific requirements. In meeting these needs, however, we will not impose undue hardships on the existing users of the bands above 3 GHz. In general, we believe that the reallocation and channelization plan proposed by Alcatel for bands above 3 GHz balances the interests of both groups.

18. Specifically, we propose to adopt Alcatel's reallocation and channelization proposals, with the exceptions of the 3.6-3.7 GHz band proposal and the proposal (also made by UTC) that 80 MHz of spectrum in the 4 GHz band currently allocated to the Fixed-Satellite Service (FSS) on a primary basis be downgraded to secondary.[7] We believe that adoption of Alcatel's basic plan will treat both private users and common carriers equitably.[8] In this regard, we note that Harris focuses on the fact that in the Notice 180 MHz of spectrum is proposed to be reallocated from private fixed use versus only 40 MHz from common carrier fixed use, whereas MCI focuses on the fact that under Alcatel's proposals private users would gain access to far more spectrum than common carriers. Since more private users than common carriers are potentially affected by the proposals in the Notice, we believe this approach is appropriate.

19. We recognize that Alcatel's sharing proposal may not be ideal for either private users or common carriers, but believe that it is a viable compromise. We do not believe that opening Part 74 spectrum to private and common carrier fixed operators, as suggested by Harris, is desirable, due to incompatible technical standards. We disagree with CTI, MCI, and PacTel that co-primary sharing and rechannelizing the 4, 6, and 11 GHz common carrier

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[7] We also propose to allow the approximately 20 existing point-to-multipoint users of the 10 GHz band to remain on a grandfathered basis. We note that none of these users commented on Alcatel's proposed reallocation of this band to point-to-point use and that point-to-multipoint DTS and DEMS spectrum is available in the 18.82-19.26 GHz band; however, given our desire not to disadvantage any existing users and their relatively small numbers, we believe that grandfathering is desirable. We request comment on this approach.

[8] We believe that adopting the sharing plan proposed herein would render moot a petition for rule making (RM-6921) filed by CTI, requesting that Part 94 microwave licensees be permitted to share the point-to-point microwave bands allocated for Part 21 use. We request comment on whether the CTI Petition can be dismissed as moot if the sharing plan proposed herein is adopted.

bands is inequitable to common carriers. We believe that coordination among fixed microwave operations of the two services -- and coordination between these terrestrial users and satellite services -- can enable efficient sharing of these bands. Correspondingly, we believe that coordination among private users and common carriers in the 6 GHz private band can allay Harris' concerns about sharing of this band. We are confident that maximizing the amount of spectrum to be shared by the two classes of users will result in its most productive use. We also note that a sharing approach has been successful in other bands, such as the 928/952 MHz multiple address bands.[9] Contrary to CTI's arguments, we believe that both private and common carrier users will be accommodated through established frequency coordination procedures.

20. We do not believe that the 3.6-3.7 GHz band can accommodate additional non-government users at this time. While the band is allocated to the non-government FSS, such use is limited due to frequency coordination and electromagnetic compatibility constraints with government users. The predominant use is for government aeronautical radionavigation and military radiolocation services. Permitting fixed microwave use of this band would create the potential for interference to these important services. Accordingly, we are not proposing to allocate this band for fixed microwave use. However, we will approach NTIA and open formal discussions to determine whether some form of shared access to the 3.6-3.7 GHz band by fixed microwave users is feasible.

21. With respect to the 4 GHz band, we conclude that the requirements of the FSS outweigh the needs of fixed terrestrial users for an exclusive primary allocation of 80 MHz in this band. Given the large amount of spectrum we are proposing be made available to terrestrial fixed users in other bands above 3 GHz, we are not convinced that such an exclusive allocation is necessary. Moreover, the adverse impact of such a reallocation on satellite services would not be acceptable, as pointed out by several commenters. Therefore, we are proposing to make private fixed microwave use co-primary in this band, but are not proposing to downgrade the FSS to secondary in any portion of the band.

22. Use of Government Spectrum. UTC states that relocation of displaced 2 GHz microwave operations to the 1.71-1.85 GHz government band would cause the least disruption to non-government 2 GHz microwave users, since the propagation characteristics of the two bands are nearly identical. UTC requests that we defer action on reallocating any portion of the 2 GHz band until negotiations with NTIA for use of the 1.71-1.85 GHz band are

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[9] See Second Report and Order, SS Docket 79-18, 50 RR 2d 1267 (1982).

completed. Centerior Energy Corporation and Ocom Corporation support using 1.71-1.85 GHz as a relocation band for 2 GHz users. MCI recommends that the Commission, in conjunction with NTIA, identify bands in the 3-11 GHz range currently used by non-classified government systems and consider making these bands available on a shared basis by fixed private and common carrier users. The Association of American Railroads (AAR) and Large Public Power Council (LPPC) maintain that proper deployment of federal spectrum can eliminate the need for forced migration of 2 GHz fixed users.

23. NTIA has recently undertaken several studies of government spectrum use. In March, it issued a report entitled "Federal Spectrum Usage of the 1710-1850 and 2200-2290 MHz Bands," which was placed into the record in this proceeding and comment thereon solicited.[10] In a letter to Chairman Sikes, acting NTIA Administrator Thomas Sugrue stated that: "In coordination with affected government agencies, NTIA will continue working with the Commission to consider ways to meet the valid needs of commercial operators currently using the frequencies at issue. NTIA will also continue reviewing the federal government use of the spectrum under NTIA's jurisdiction."[11] In testimony before the Senate Communications Subcommittee on June 3, 1992, Mr. Sugrue also stated that some spectrum in the 1.71-1.85 GHz band might be available for certain long microwave paths that could not be accommodated higher in the spectrum. Mr. Sugrue noted that NTIA is expected to issue a report shortly identifying portions of this band that might be used to accommodate these long microwave paths.

24. We believe that the proposals presented herein will meet the needs of 2 GHz fixed microwave users. We therefore are not delaying this proceeding pending negotiations with NTIA for access by non-government licensees to the 1.71-1.85 GHz government band. We continue discussions with NTIA on this issue, however, and will make appropriate modifications when we issue our final decision, should the situation change.

25. Coordination Procedures and Technical Standards. Alcatel recommends that the Part 21 coordination standards be applied to all bands proposed for reallocation. It further proposes: 1) dropping voice channel loading requirements and analog performance standards and substituting minimum digital system loading requirements; 2) that the current minimum path length requirements set forth in Section 21.710 of our rules be made flexible, so that path lengths shorter than the minimums would be

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[10] See note 3, supra.

[11] See letter of May 4, 1992 from Thomas J. Sugrue to Alfred C. Sikes.

permitted if the equivalent isotropic radiated power (EIRP) did not exceed a specified value or if an appropriate technical showing were made; 3) that Part 21 and Part 94 antenna characteristics be updated and made consistent in all bands; 4) that power limitations be updated to include the proposed new private bands; 5) that Part 94 emission and bandwidth limitations be updated to conform to the proposed channelizations; 6) that frequency diversity transmissions,[12] currently restricted under Part 21, also be restricted under Part 94; and 7) that automatic transmit power control (ATPC) be permitted under Part 94.

26. UTC and Harris recommend that the Commission convene an industry committee to develop new technical requirements and interference criteria for the 4, 6, and 11 GHz common carrier bands. In UTC's view, our proposal to waive eligibility requirements for private access to common carrier bands does not address the issue of interference standards between common carrier and private systems. UTC asserts that the current common carrier interference standards are not as stringent as private standards and would not adequately protect many public safety/public service microwave systems and, therefore, many private users of the 2 GHz band would suffer degraded service if relocated to common carrier bands. UTC also argues that common carrier coordination procedures should not be applied to private users. UTC contends that the current coordination rules for each microwave band should remain, i.e., if a private user desires to use an existing common carrier band, it should be subject to Part 21 coordination procedures; and if a common carrier desires to use an existing private band, it should be subject to Part 94 coordination procedures.

27. Harris states that an industry committee should develop consensus on the issues raised by UTC and Alcatel, as well as on additional issues, before the Commission proceeds to rule making. Harris argues that changes to Parts 21 and 94 should adequately accommodate both private and common carrier fixed users and that an industry committee can best enable this. Harris also suggests incorporating all channelization plans into the rules to facilitate standard equipment design; permitting expansion of existing microwave systems above 3 GHz under current channelization plans without waiver; and formalizing the informal common carrier coordination process by which channels are reserved for future growth and thereby formalizing time limits for how long a growth channel may be reserved. Harris concurs with Alcatel that ATPC be incorporated into Part 94 of the rules, but says that additional rule changes may be necessary to implement it because, in its view, it is unclear that ATPC is permitted under Part 21. Finally, Harris argues that current power mask rules need to be

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[12] Frequency diversity transmissions refer to non-working channels that protect working channels from interference.

updated to allow manufacturers to design more cost-effective equipment capable of providing longer and more reliable path lengths at higher frequencies without causing additional out-of-band interference. Harris says that an industry committee could update, among other rules, the power mask requirements.

28. The Telecommunications Industry Association Fixed Point to Point Communication Section (TIA) agrees with Alcatel's proposals to drop voice channel loading requirements and analog performance standards because fixed microwave users are rapidly converting to digital technology. UTC states that voice channel loading requirements -- whether analog or digital -- should be eliminated for private fixed operations in the 4, 6, and 11 GHz common carrier bands, but disagrees that analog standards are unnecessary, maintaining that Alcatel's proposals are biased toward digital technology, that the majority of existing 2 GHz operators use analog equipment, and therefore that the impact on use of analog equipment should be addressed by the Commission. Comsearch expresses concern that Alcatel is overlooking a significant number of analog users in the 4, 6, and 11 GHz common carrier bands. Harris says that it generally agrees with the minimum digital system performance requirements proposed by Alcatel, but believes that a phased approach to achieving spectral efficiency should be implemented. Digital Microwave Corporation (DMC) argues that the payload capacity requirement for channels of 1.6 MHz and below should not be increased from the present requirement of one bit per second per Hertz, because of cost considerations. According to DMC, increasing the requirement for these channels would increase the cost of narrow bandwidth equipment to such an extent that there would be little use of channels of 1.6 MHz or less bandwidth.

29. Regarding UTC's and Harris' proposal for an industry committee to address technical issues, we believe that such a committee can serve a highly useful function. However, contrary to Harris, we see no need to delay this proceeding pending the formation of such a committee. Rather, we believe that our technical proposals set forth herein will assist such a committee with its deliberations. Further, we are not convinced that there is a need for the Commission to participate in such a committee at this time. Accordingly, we encourage fixed microwave users to form such a committee and will consider any comment they may have on the proposals herein within the comment period.

30. With respect to coordination procedures in the bands proposed for reallocation, we note that the basic difference in private and common carrier procedures is that in common carrier bands new users must notify potentially-affected licensees of their planned use, whereas there is no such requirement in private bands. We believe it would be least disruptive to existing users to maintain current procedures in each band, as proposed by UTC. Thus, in the 4, 6, 10, and 11 GHz common carrier

bands, we propose that Part 21 coordination procedures be used, whereas in the 6 GHz private band, we propose that Part 94 procedures be used. For all of these bands, we solicit comment on whether frequency coordinators should establish time limits for the reservation of growth channels, such as a six month reservation period. We propose to use Part 21 interference standards in all bands except the 6 GHz private band, where Part 94 standards will apply. We note, however, that these standards are converging. While Section 94.63(b) of the Rules specifies stringent interference standards, Section 94.63(d) states that the use of standards developed by industry associations is acceptable. In practice, these associations are now developing similar, if not identical, standards for both private and common carrier fixed users. Despite the current differences in Part 21 and Part 94 interference standards, and the claim by UTC that inadequate protection is offered to private users who may need to relocate to the common carrier bands, we believe that many private uses can be accommodated in those bands without jeopardizing the quality of service.

31. We agree with Alcatel and TIA that digital equipment is increasingly being used in place of analog, and that new digital standards should be proposed in Parts 21 and 94. However, we also believe that existing voice channel loading requirements and analog performance standards should be maintained for the large number of analog users noted by UTC and Comsearch. Accordingly, we propose to adopt the digital standards recommended by Alcatel while proposing to maintain existing voice channel loading requirements and analog standards. We note Harris' concern that digital standards should be phased in and DMC's concern regarding the cost of narrow bandwidth equipment under Alcatel's proposed standards, and request comment on the validity of these concerns.

32. We concur with Harris that channelization plans should be incorporated into the rules to allow standard equipment design. Accordingly, we set forth in Sections 21.701 and 94.65 of our proposed rules the proposed channelization plans for the five bands under consideration herein. Further, we agree with Harris that expansion of existing microwave systems should be allowed under current channelization plans without waiver. Our goal is to permit new users to access the five bands without adversely affecting existing licensees.

33. Regarding ATPC, we concur with Alcatel that this technique is currently permitted under Part 21 of the rules, but disagree with both Alcatel and Harris that it is not permitted under Part 94. Section 94.45 states that effective radiated power may be changed without license modification provided that the change is no greater than 3 dB. However, to clarify this point, we propose to substitute the word "increase" for "change" in Section 94.45. We also propose to add language to Sections 21.710 and 94.79 that explicitly authorizes the use of ATPC. Finally, we

solicit comment on Harris' proposal to update the power mask rules and Alcatel's proposals -- set forth in the rules appendix essentially as proposed by Alcatel -- for minimum path length requirements, antenna characteristics, frequency diversity transmissions, and power, emission, and bandwidth limitations.

34. Suspension of Proceeding. UTC proposes that we defer action on the emerging technology spectrum proposals in this proceeding pending consideration of its petition. Comments are mixed on UTC's proposal. American Personal Communications (APC), American Telephone and Telegraph, Inc. (AT&T), Motorola, Inc., SCS Mobilecom, Inc. (SCS), and Spatial Communications, Inc. (SCI) oppose it, contending that deferring action could delay the implementation of broadband PCS.[12]

35. We believe it is unnecessary to defer action on the proposals made in the Notice in order to consider both UTC's and Alcatel's proposals. As APC, AT&T, Motorola, SCS, and SCI note, deferring action could delay the implementation of important new services, including PCS. Accordingly, we contemplate proceeding with final action on our emerging technology proposals and those herein in an expeditious manner, whether jointly or separately.

36. Our specific proposals for all rules sections proposed to be modified are contained in the rules appendix. We solicit comment on them.

PROCEDURAL MATTERS

37. Regulatory Flexibility Analysis. Pursuant to the Regulatory Flexibility Act of 1980, the Commission finds as follows:

A. Reason for Action

This rule making proceeding is initiated to obtain comment regarding rules for relocating 2 GHz fixed microwave users to bands above 3 GHz.

B. Objective

The objective of this proposal is to reaccommodate current 2 GHz common carrier and private fixed microwave operators above 3 GHz with appropriate channelization plans and technical rules.

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[12] On July 16, 1992, the Commission proposed to allocate the 901-902, 930-931, and 940-941 MHz bands for narrowband PCS and the 1850-1895 and 1910-1975 MHz bands for broadband PCS. See Notice of Proposed Rule Making and Tentative Decision, GEN Docket No. 90-314 and ET Docket No. 92-100, FCC 92-333.

C. Legal Basis

The proposed action is authorized by Sections 4(i), 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 303(c), 303(f), 303(g), and 303(r). These provisions authorize the Commission to make such rules and regulations as may be necessary to encourage more effective use of radio in the public interest.

D. Description, Potential Impact, and Number of Small Entities Affected

This proposal would provide for the reaccommodation above 3 GHz of 2 GHz private and common carrier fixed microwave operators, some of which are small entities. This proposal may provide new opportunities for radio manufacturers and suppliers of radio equipment, some of which may be small businesses, to develop and sell new equipment in the bands above 3 GHz. We invite specific comment by interested parties on the likely magnitude of the impact on small radio manufacturers and suppliers.

E. Reporting, Record Keeping, and Other Compliance Requirements

None.

F. Federal Rules That Overlap, Duplicate or Conflict With This Rule

None.

G. Significant Alternatives

If promulgated, this proposal will reaccommodate 2 GHz fixed microwave users in the most beneficial way to them and the broader public interest. We are unaware of other alternatives that would be as desirable. We solicit comments on this point.

38. Other Matters. This is a non-restricted notice and comment rule making proceeding. Ex parte presentations are permitted, provide they are disclosed as provided in Commission rules. See generally 47 C.F.R. Sections 1.1202, 1.1203, and 1.1206(a).

39. This action is taken pursuant to Sections 4(i), 303(c), 303(f), 303(g), and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154(i), 303(c), 303(f), 303(g), and 303(r).

40. Pursuant to applicable procedures set forth in Sections 1.415 and 1.419 of the Commission's Rules, interested parties may file comments on or before December 4, 1992, and reply comments

on or before January 6, 1993. All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. To file formally in this proceeding, participants must file an original and four copies of all comments, reply comments, and supporting comments. If participants want each Commissioner to receive a personal copy of their comments, an original plus nine copies must be filed. Comments and reply comments should be sent to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference Room (Room 239) of the Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554.

41. For further information concerning this rule making contact Rodney Small, (202) 653-8116, Office of Engineering and Technology, Federal Communications Commission, Washington, D.C. 20554.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy

Donna R. Searcy
Secretary

Appendix A-- PROPOSED RULE CHANGES

I. Part 2 of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

PART 2 - FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation in Part 2 continues to read:

AUTHORITY: Sec. 4, 302, 303, and 307 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 154, 154(i), 302, 303, 303(r), and 307, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations is amended as follows:

a. Add a primary allocation for the Private Operational-Fixed Microwave Service in column (6) of the 3700-4200 MHz band.

b. Add a primary allocation for the Private Operational-Fixed Microwave Service in column (6) of the 5925-6425 MHz band.

c. Add a primary allocation for the Domestic Public Fixed Services in column (6) of the 6525-6875 MHz band.

d. Add a primary allocation for the Private Operational-Fixed Microwave Service in column (6) of the 10.55-10.60 GHz band.

e. Add a primary allocation for the Private Operational-Fixed Microwave Service in column (6) of the 10.60-10.68 GHz band.

f. Add a primary allocation for the Private Operational-Fixed Microwave Service in column (6) of the 10.7-11.7 GHz band.

2.106 Table of Frequency Allocations

* * * * *

International Table			United States Table		FCC use designators	
Region 1 Allocation MHz	Region 2 Allocation MHz	Region 3 Allocation MHz	Government Allocation MHz	Non-Government Allocation MHz	Rule Part(s)	Special-Use Frequencies
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	*	*	*	*	*	
	3700-4200 FIXED. FIXED-SATELLITE (space-to-Earth). MOBILE except aeronautical mobile. 787		3700-4200	3700-4200 FIXED. FIXED-SATELLITE (space-to-Earth). NG41	DOMESTIC PUBLIC FIXED(21). SATELLITE COMMUNICATIONS (25). PRIVATE OPERATIONAL-FIXED MICROWAVE(94).	
	*	*	*	*	*	

International Table			United States Table		FCC use designators	
Region 1 Allocation MHz	Region 2 Allocation MHz	Region 3 Allocation MHz	Government Allocation MHz	Non-Government Allocation MHz	Rule Part (s)	Special-Use Frequencies
(1)	(2)	(3)	(4)	(5)	(6)	(7)
5925-7075	FIXED. FIXED-SATELLITE (Earth-to-space). MOBILE. 791 809		5925-7125	5925-6425 FIXED. FIXED-SATELLITE (Earth-to-space).	DOMESTIC PUBLIC FIXED(21). SATELLITE COMMUNICATIONS(25). PRIVATE OPERATIONAL-FIXED MICROWAVE(94).	
			791 809	NG41		
				6425-6525 FIXED-SATELLITE (Earth-to-space).	AUXILIARY BROADCAST(74). CABLE TELEVISION(78).	
				MOBILE.	DOMESTIC PUBLIC FIXED(21).	
				791 809	PRIVATE OPERATIONAL FIXED MICROWAVE(94).	
				6525-6875 FIXED. FIXED-SATELLITE (Earth-to-space).	DOMESTIC PUBLIC FIXED(21). PRIVATE OPERATIONAL-FIXED MICROWAVE(94).	
				809		

International Table			United States Table		FCC use designators	
Region 1 Allocation GHz	Region 2 Allocation GHz	Region 3 Allocation GHz	Government Allocation GHz	Non-Government Allocation GHz	Rule Part (s)	Special-Use Frequencies
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	*	*	*	*	*	
10.55-10.60	FIXED. MOBILE except aeronautical mobile. Radiolocation.		10.55-10.60 FIXED.	10.55-10.60 FIXED.	DOMESTIC PUBLIC FIXED(21). PRIVATE OPERATIONAL-FIXED MICROWAVE(94).	
10.60-10.68	EARTH EXPLORATION SATELLITE (passive). FIXED. MOBILE except aeronautical RADIO ASTRONOMY. SPACE RESEARCH (passive). Radiolocation. 831 832		10.60-10.68 EARTH EXPLORATION-SATELLITE (passive). SPACE RESEARCH (passive). US265 US277	10.60-10.68 EARTH EXPLORATION-SATELLITE (passive). FIXED. SPACE RESEARCH (passive). US265 US277	DOMESTIC PUBLIC FIXED(21). PRIVATE OPERATIONAL FIXED MICROWAVE(94).	
	*	*	*	*	*	

International Table			United States Table		FCC use designators	
Region 1 Allocation GHz	Region 2 Allocation GHz	Region 3 Allocation GHz	Government Allocation GHz	Non-Government Allocation GHz	Rule Part (s)	Special-Use Frequencies
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	*	*	*	*	*	
10.7-11.7 FIXED. FIXED-SATELLITE (space-to-Earth) (Earth-to-space). MOBILE except aeronautical mobile. 835	10.7-11.7 FIXED. FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile.		10.7-11.7	10.7-11.7 FIXED. FIXED SATELLITE (space-to-Earth).	DOMESTIC PUBLIC FIXED(21). PRIVATE OPERATIONAL-FIXED MICROWAVE(94).	
	*	*	*	*	*	

II. Part 21 of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

PART 21 - DOMESTIC PUBLIC FIXED RADIO SERVICES

1. The authority citation in Part 21 continues to read:

AUTHORITY: Secs. 1, 2, 4, 201-205, 208, 215, 218, 303, 307, 313, 314, 403, 404, 410, 602; 48 Stat. as amended, 1064, 1066, 1070-1073, 1076, 1077, 1080, 1082, 1083, 1087, 1094, 1098, 1102; 47 U.S.C. 151, 154, 201-205, 208, 215, 218, 303, 307, 313, 314, 403, 404, 602; 47 U.S.C. 552.

2. Subpart C is amended by revising sections 21.100, 21.108, and 21.122 to read as follows:

Section 21.100 Frequencies.

* * * * *

(c) Frequency diversity transmission will not be authorized in these services in the absence of a factual showing that the required communications cannot practically be achieved by other means. Where frequency diversity is deemed to be justified on a protection channel basis, it shall be limited to one protection channel for the bands 3,700-4,200 MHz, 5,925-6,425 MHz, and 6,525-6,875 MHz, and a ratio of one protection channel for three working channels for the bands 10,550-10,630 MHz and 10,700-11,700 MHz. In the bands 3,700-4,200 MHz, 5,925-6,425 MHz, and 6,525-6,875 MHz, no frequency diversity protection channel will be authorized unless there is a minimum of three working channels, except that where a substantial showing is made that a total of three working channels will be required within three years, a protection channel may be authorized simultaneously with the first working channel. A protection channel authorized under such exception will be subject to termination if applications for the third working channel are not filed within three years of the grant date of the applications for the first working channel. Where equipment employing digital modulation techniques with cross-polarized operation on the same frequency is used, the protection channel authorized under the above conditions may be considered to consist of both polarizations of the protection frequency where such is shown to be necessary.

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Section 21.108 Directional antennas.

* * * * *

(c) * * *

Antenna Standards

Frequency (MHz)	Category	Maximum beam-width to 3 dB points (included angle in degrees)	Minimum antenna gain (dBi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
932.5 to 935	A	14.0	n/a		6	11	14	17	20	24
941.5 to 944	B	20.0	n/a			6	10	13	15	20
2,500 to 5,000	A	n/a	36	23	29	33	36	42	55	55
	B	n/a	36	20	24	28	32	32	32	32
5,000 to 10,550	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
10,550 to 10,680	A	3.4	34	20	24	28	32	35	55	55
	B	3.4	34	20	24	28	32	35	35	39
10,700 to 11,700	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
11,700 to 12,700	A	1.0	n/a	23	28	35	39	41	42	50
	B	2.0	n/a	20	25	28	30	32	37	47
17,700 to 18,820	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
18,920 to 19,700 [1]	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
21,200 to 23,600	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36
31,000 to 31,300 [2] [3]	n/a	4.0	38	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Above 31,300	A	n/a	38	25	29	33	36	42	55	55
	B	n/a	38	20	24	28	32	35	36	36

* * * * *

(d) * * *

(e) These limitations are necessary to minimize the probability of harmful interference to reception in the bands 5925-6875 on board geostationary space stations in the fixed-satellite service (Part 25).

(1) 5925 to 6875 MHz. * * *

(2) * * *

Section 21.122 Microwave digital modulation.

(a) Microwave transmitters employing digital modulation techniques and operating below 15 GHz shall, with appropriate multiplex equipment, comply with the following additional requirements:

(1) The bit rate, in bits per second, shall be equal to or greater than the bandwidth specified by the emission designator in Hertz (e.g., to be acceptable, equipment transmitting at a 20 Mb/s rate must not require a bandwidth of greater than 20 MHz), except the bandwidth used to calculate the minimum rate shall not include any authorized guard band.

(2) For digital modulation the following requirements must be met:

Nominal Channel Bandwidth (MHz)	Minimum Payload Capacity (Mbits/s)	Minimum Traffic Loading Payload (as percent of payload capacity)	Typical Utilization
0.400	1.54	n/a	1 DS-1
0.800	3.08	n/a	2 DS-1
1.60	6.17	n/a	4 DS-1
3.20	12.3	n/a	8 DS-1
5.00	18.5	n/a	12 DS-1
10.0	44.7	50	1 DS-3/STS-1
20.0	89.4	50	2 DS-3/STS-1
30.0	89.4	50	2 DS-3/STS-1

For all bands, concatenation of multiple contiguous channels is permitted as long as the minimum payload capacity requirements are met.

(3) The required minimum payload capacity shown in paragraph (a)(2) of this section may be reduced by a factor of 1/N provided that N transmitters may be operated satisfactorily within an authorized bandwidth less than, or equal to, the maximum authorizable bandwidth over the same radio path (e.g., the 89.4 Mb/s requirement for a 20 MHz maximum bandwidth may be reduced to 44.7 Mb/s if two transmitters can